Economic and political determinants of urban expansion

Albert Solé-Ollé & Elisabet Viladecans-Marsal

Universitat de Barcelona &

Institut d'Economia de Barcelona (IEB)

ABSTRACT:

We examine the economic and political determinants of the decision taken by local governments regarding the amount of new land allowed to be developed. The analysis uses a huge database including more than 2,000 Spanish municipalities during the 1999-2003 term-of-office. The increase in developable land in 1999-2003 is explained using a wide set of variables picking up the traits of each municipality in 1999. The variables have been selected after reviewing the recommendations of the literature on urban growth controls and taking also into account causes that should be considered specific to Spain. The results show that urban expansion is influenced by a variety of factors. For example, the communities expanding more: (i) are rich, (ii) have more new housing buyers, (iii) are in a weak financial position, (iv) are controlled by right parties, (iv) have a local government that do not face serious electoral competition, and (v) have more land but a lower proportion of environmentally valuable land.

JEL codes: H7, Q15, R52

Key words: land-use regulations, urban growth controls, political economy

1.- Introduction

In the last two decades Spain has witnessed a striking increase in the amount of developed land. According to the data provided by the *Corine Land Cover* project (Ministerio de Fomento, 2006) during the period 1987-2000 artificial land area grew by 29.5%, roughly one third of its overall historical record. Moreover, this growth is unevenly distributed across the Spanish geography, being especially intense in urban areas (e.g., Madrid, which grew by 50% during this period) and tourist areas along the Mediterranean coast (e.g., Murcia, Valencia and the Balearic Islands grew by 60, 50 and 40%, respectively, during the period). Most of this grow is explained by low density urban growth (which increased by 30% during the period) and by scattered development (with an increase of 26%); one the other side, the area devoted to compact development has increased only by a thin 4.1%[1].

Many of the journalists, academics and politicians that have addressed this issue in Spain evaluate this growth as excessive. The high urban growth and its sprawling nature are blamed to be the cause of higher congestion and pollution, of raising the costs of public services and of loss of open space. Regarding this last point, note that although a 70% of the increase in artificial land consumed agricultural land (which is the one that is closer to the already buildup area), a 25% consumed environmentally valuable forest areas. Moreover, in tourist areas, growth often occurred behind wild beaches, with the result that actually the 34% of the first Km along the Mediterranean coast is already build up[2]. Of course, there are also some opinions that qualify this growth as too low, the argument here being that, despite this growth, housing prices have been growing very fast since the mid 90's, causing a housing affordability problem.

To resolve the controversy regarding the positive or negative effects or urban expansion is, however, outside the scope of this paper. Our aim is simply to provide an exploratory analysis to ascertain which are the causes of this urban expansion. It is rather obvious that the main cause of urban expansion in Spain since mid 90's is the

[1] The geographical pattern of growth has been very similar during the period 1999-2003, which is the one we analyze in the paper. The intensity of the phenomenon in recent years is, however, even stronger (see tables in the Annex).

[2] The European Environment Agency has recently published a report warning about the costs of urban expansion, devoting special attention to the impact on natural and protected areas and analyzing the pressure that urban growth puts on Natura 2000 sites. The threats faced by environmental spaces in Spain, specially the coastline, receive special attention in the report (EEA, 2006).

growth of the demand of both residential and vacation houses. This rise in demand had many causes, from high population and income growth, to low interest rates or the surge in foreign investment. But aside of these very general factors, Spanish commentators also identify other municipal-specific influences. The first one is local fragmentation, since in Spain the main land-use regulatory responsibilities are in the hands of more than 9,000 municipalities. Municipalities are perceived to care only about local interests, disregarding the protection of regional or national public goods as, for example, the protection of environmentally-valuable open-space[3].

The second cause is related to the financing system of Spanish municipalities, which relies heavily on revenues related to development: the *property tax*, a *tax on building activities*, a *tax on land transactions*, the obligation of developers to give to the municipality a portion of developed land, and even the possibility of contracting between the municipality and the developer, exchanging land for money. It has been argued that some short-sighted municipalities, disregarding the future costs of development (either fiscal or environmental) tend to use new development as a 'revenue-machine'[4]. The third cause is related to corruption in the decision to convert land from rural to urban use. Since urban boundaries in Spain tend to be updated only from time to time, a demand surge uses to generate a huge price differential at the fringe, creating the rent needed to fuel the bribes to be paid by developers to local politicians[5]. But, of course, all the municipalities face the same regulatory framework and some face similar demand pressures, and not all are equally prone to expand the amount of developable land. The most expansionist municipalities should be perhaps those controlled by politicians that are more sensible to the interests of developers and/or those facing softer democratic controls.

We will try to bring some empirical evidence on the validity of these three causes. Of course, we will not limit ourselves to such a narrow range of explanations, and we

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[3] The opinion that Spanish municipalities are overgrazing the commons has been stated by several journalists. For example, Enrique Gil-Calvo qualified Spanish urbanism as a 'tragedy of the commons' (Hardin 1968); see the article "El mal de Marbella" (*El País*, 24/04/2006).

[4] In a recent editorial, the main Spanish newspaper clearly describes this problem: "the municipalities, indebted and without the required flow of own revenues, have in land development its main and temptress financing source" (El País, 6/10/2006).

[5] The 2006 report on Spain by Transparency International clearly states than one of the main corruption problems in Spain occurs at the local level and is related to land-use regulation. The report states that "the higher levels of corruption are found in local governments", mainly "along the coastline (...) or in the vicinity of big cities" and the cause of this phenomenon is related, according to TI, to the "ability to change the land-use status".

will search the theory of growth controls (see section 3) to find additional hypotheses to be tested. Some of the explanations we will find are of national and regional nature, but others (as the last two presented in the previous paragraph) are really local. Most of the empirical analyses trying to explain urban expansion in the US use data aggregated at the metropolitan area level and therefore focus on interregional variation of growth (e.g., Carruthers, 2003; Carruthers & Ulfarsson, 2002; Burchfield et al 2006). However, as we stated above, we are interested in understanding the causes of the decision to put more developable land in the market, which in Spain are mainly taken by the municipalities. Interregional analysis will make difficult to trace out the effect of some specific municipal traits on urban expansion (e.g., political traits that make a local government more prone to be influenced by the interest of developers).

However, only a few papers, more interested in explaining differences in land use regulation practices across US local governments than on growth outcomes, started to perform intra-regional analyses (see, e.g., Bates and Santerre, 1994; Brueckner, 1998; Evenson and Wheaton, 2003; Evenson, 2003; and Glaeser and Ward, 2006). Our paper resembles very much those, since we also focus on land use decisions made by local governments. The papers by Evenson (2003) and Evenson and Wheaton (2003) are the closest ones to ours, since their aim is to explain intra-regional differences in the amount of protected land area, which is just the reverse of the amount of land allowed to be developed, the variable that we analyze. The main difference with these two papers is that, instead of analyzing the absolute amount of developable land that each community has in a given year, we concentrate on the amount of land that each local government added to the stock of developable land during a term-of-office. By relating the growth in developable land to initial traits of each community we are able to get rid off on the endogeneity problems which plague the cross-sectional analysis and, at the same time, to concentrate on the real decision taken by local governments (i.e., pass a new land regulation which allows a certain new amount of land to be developed).

Moreover, our procedure will allow us also to consider the possible influence of area-wide factors, as in typical interregional analysis. With this purpose, we will proceed in two stages; in the first one we will perform an intraregional analysis by controlling for the traits that are common to all the municipalities in a given area. With this purpose, we will divide all the Spanish geography in 211 areas (62 urban area, 50 non-urban area, and 99 tourist areas, see section 4 for details) and introduce in the regression a fixed effect for each area. The results of the first-stage will be used to compute the average-area effects, purged from the effects of the municipal–specific variables. These average-area effects will then be regressed in the second stage against average-area variables aimed to control for the basic determinants of growth that use to be considered in classical interregional analysis.

To perform our analysis we use data on the amount of developable land provided by the Spanish national property assessment agency (Dirección General del Catastro) and which arises as a byproduct of the assessment process which this agency performs on all properties of the country. Although value reassessments are carried only from time to time, the update in the traits of each land plot others than the assessed value (and thus its classification as developed, developable or not developable) is done yearly. This database covers the period 1995-2003, but difficulties with the data needed to compute some of the explanatory variables recommended to focus on the period 1999-2003, which covers exactly one term-of-office of Spanish municipalities. The explanatory variables will be measured for the first year or the period, 1999 (or the closest one available).

The paper is organized as follows. The second section provides a basic theoretical framework which helps us in developing the different hypotheses we aim to test. The third section performs the empirical analysis: it presents the equation to be estimated, discusses the econometric procedure, and describes the concrete variables used to make operative the hypotheses developed in the third section. The results are presented in the fourth section. The last section provides the main conclusions of the paper.

2.- Theoretical framework

The purpose of the paper is to analyze the decisions taken by municipalities over the land area allowed to be developed in the future. Therefore, although this decision uses to be embedded in complex planning documents including regulations of many other aspects (e.g., minimum lot size, land use zoning, height and footage restrictions, etc.) we concentrate on the amount of 'developable land'. This decision has two main advantages; first, on the practical side, this is precisely what we are able to measure for all Spanish municipalities; second, on the theoretical side, there are yet some papers which model local decision-making on 'growth controls' or 'urban growth boundaries', which are the terms used in the literature to refer to the amount of developable land. In this section we search this literature with the purpose of deriving several theoretically-founded hypotheses related to economic and political determinants of urban expansion.

The impacts of ‘urban growth controls’ can be analyzed using the standard urban model developed by Alonso (1964), Muth (1967), Mills (1972) and Wheaton (1974). The papers by Brueckner (1990) Brueckner and Lai (1996) model growth control decisions using this approach, while Brueckner (1999) provides a good survey of this literature. In this section we will use a very simplified version of this model, presented in Brueckner (1999), to derive our testable hypotheses. One possible shortcoming of this model is that it is static in nature, while growth control decisions are dynamic; however, the main insights provided by the model maintain in more complex dynamic settings (see, e.g., Brueckner, 1990). The second problem in using this model for our purposes is that it has been argued that it is more appropriate for the analysis of the growth of cities belonging to different urban areas (see, e.g., Brueckner, 1999, p. 440), while we will used it also to analyze the urban expansion of different suburban communities inside the same area[6], as other authors also do (e.g., Hilber and Robert-Nicoud, 2006). We think the model provides also an appropriate tool of analysis of the growth decisions of suburbs if one accepts the basic premise that there is only one employment location in the urban area, namely the central city. Of course, some of the predictions of the model will not be the same for urban than for non-urban areas, but we will it into account in the empirical implementation.

The section is organized as follows. First, we present the basic version of the model, which assumes that growth controls are chosen only in the interests of landowners. Second, we present the additional results obtained when renters and owners of undeveloped land are allowed to play some role in the political process. Third, we discuss the effects of introducing in the model the benefits provided by open space and to allow these benefits to spill over community boundaries. Finally, we discuss several additional hypotheses which do not fit well with the canonical growth control model but which may be interesting to consider in the empirical analysis.

2.1.- *Basic model: when landowners dominate the political process*

The workings of the basic version of the model are as follows. We have an area labeled with k which has n_k communities. Each community i is populated by mobile

[6] Urban expansion in Spain has been very high not only in urban areas but also in non-urban and tourists areas, so a complete approximation to the problem should take into account all areas.

renters who commute to work in the central part of the community, earning the wage y_i and incurring time an money costs that increase with distance l from his dwelling to the center, and which are given by $t_k l$[7]. We also assume that t_k is the same in all the communities, something that is really appropriate since we will not be able to measure this variable at the municipality level. Renters consume land, whose amount is fixed at one unit per household and a private good, denoted c_i which is different from one community to another for reasons that will be evident below. The utility of each resident also depends on the population N_i of the community $u_i = c_i - \beta_i N_i$ where β_i is an externality parameter, picking up the impact of new residents, and that we also allow to differ across communities[8]. It is also assumed that the land under the jurisdiction of the community (both developed and undeveloped) is owned by absentee landowners. The budget constraint of a renter household living at a distance l from the city center is $c_i + r = y_i - t_k l$, where r is the rent per unit of land. Rearranging we obtain the bid-rent function $r = y_i - t_k l - c_i$. This bid-rent function is downward-sloping; indicating that rents are higher close to the center and lower as the community expands far from it, and is linear, a consequence of fixed land consumption.

Consider now the growth control decision of a controlling city i considering that the remaining n-1 cities of the urban area, labeled also with k, are passive[9]. In this case, the equilibrium conditions are (see Brueckner, 1999):

$$l_i + (n-1)l_k = N_k \quad (1a)$$

$$c_i + \beta_i N_i = c_k + \beta_k N_k \quad (2a)$$

$$y_i - tl_k - c_k = 0 \quad (3a)$$

[7] Note that each community has a different working center, meaning that this model is less appropriate for suburban communities whose residents commute to the same center. This model will be more appropriate for our sample of non-urban communities. However, the model can be easily adapted to fit the reality of communities belonging to an urban area (suburbs) by simply saying that the income level is now equal for all the communities belonging to the urban area k, which could be assumed for simplicity that are boundary-neighbors of the central city and are located on a circular ring around it. The model is also less appropriate for tourist areas, since the purpose of developing in not only attracting resident-workers but also people on vacation that do not care, therefore, about job opportunities.

[8] It is common to assume that new residents impose a net cost to the existing ones. This is natural since these model have been developed to explain why some communities restrain growth, which is reasonable in the US context. As we will explain in section 4, it is not clear that additional residents ‘always’ have disamentiy effects, at least in Spain. This means that β could be not only different across communities but even negative,

[9] This means that we abstract in this paper from strategic interactions in the setting of growth controls which arise when there are many active cities (see Brueckner, 1998 and 1999).

The first condition says that total renter population N_k must live in one of the n_k communities. The second ones says that utility must be the same in the controlling city than in one of the (identical) passive cities, and the third one says that boundary rent must be zero in passive cities. Solving the system (1)-(3) we can obtain the expressions for c_i and c_k as a function of l_i (the spatial size chosen by the controlling city). These expressions (which are omitted here to save space) tell us that consumption falls in both communities as l_i is reduced. This is a direct consequence of the higher land rents in both communities. The utility of the renter is also affected negatively by a reduction in l_i. However, total land rent in the community increases as l_i is reduced because although there is a loss of rental income at the edge of the city (less land is developed) there is a gain in interior rents owing to an increase in the level of the land-rent function. Total land rent is maximized when these two effects are equal. This growth control model therefore depicts a conflict of interest between landowners and renter, the first group demanding less development and the second one demanding more. The solution obtained depends on the which group we assume has more political power. Traditionally, it has been more common to maintain the assumption that landowners dominate the political process (see, e.g., Brueckner, 1999 and Brueckner and Lai, 1996), with boundaries chosen in their interest. In this case the government is assumed to maximize total land rent. The resulting spatial size of the community is:

$$l_i = \frac{(y_i - y_k) + (\beta_k + t_k) n_k N_k}{\beta_i (n_k - 1) + (\beta_k + t_k)(n_k + 1)} \quad (4)$$

Expression (4) allows us to derive the following hypothesis:

H1: *Urban expansion is higher the richer is the community relative to the area* ($\partial l_i / \partial y_i > 0$ and $\partial l_i / \partial y_i < 0$).

The US literature points to income (and population) increases as one of the main drivers of urban expansion (Brueckner, 2000; Glaeser and Kahn, 2004; Mieszkowski and Mills, 1993). This hypothesis will be especially appropriate for communities in non-urban areas, where it may be true that most people work in the community of residence. However, it may not hold in urban communities if it is true that there is only one city center[10]; in practice, local income may also have some impact in urban areas, since most of them are polycentric (i.e., the have more than one job center). The impact

[10] Note that with only one job center income will be equal across communities and will, therefore, disappear from expression (4).

may be lower in tourist areas where development has the purpose of attracting residents but also of buil-ding vacation homes.

It is interesting to note that any other amenity will have the same effect on urban expansion as income. We will expect therefore that communities with better amenities (e.g., weather, proximity to the coast, distance to the central city in the case of urban areas, etc) will expand more. Of course, it may well happen that the amenities that are crucial in urban areas (e.g., distance to the central city) are not the same than those that are important in a tourist area (e.g., distance to the beach).

H2: *Urban expansion is higher the higher the number of municipalities in the urban area* ($\partial l_i / \partial n_k > 0$).

The higher the number of municipalities the lower the market power of the controlling municipality and the lower, therefore, its ability to raise rents trough the area. There are also other papers in the literature considering the effect of fragmentation on urban growth or sprawl, although the evidence they find is about this relationship is rather weak (Carruthers and Ulfarsson, 2002; Carruthers, 2003; Razin and Rosentraub, 2000). Moreover, the arguments used by these paper are sometimes different that this one. One alternative argument to justify a possible impact of positive impact fragmentation on growth is related to the environmental value provided by open space. If open space is a regional public good, local governments will underprovide it, and the level of provision will be lower the more fragmentation there is[11].

H3: *Urban expansion is higher the lower the commuting costs in the urban area* ($\partial l_i / \partial t_k < 0$)

Commuting costs (per unit of distance) will be lower the low are gasoline prices and the better are roads. Many authors point also to transport costs as one of the main drivers of the expansion in the spatial size of cities, finding in general evidence in favor of this hypothesis (Glaeser & Kahn, 2003; Brueckner, 2000; Mieszkowski & Mills, 1993; Burchfield et al 2006).

H4: *Urban expansion is higher the lower/ higher the disamenity effects created by new residents in the municipality/ urban area* ($\partial l_i / \partial \beta_i < 0$ and $\partial l_i / \partial \beta_k < 0$).

[11] Note that although the fragmentation leads to more urban growth in both models, in the first case fragmentation is the solution of the problem (helps avoiding the effects of municipalities having market power) while in the second is the problem (a big municipality will internalize a higher proportion of the benefits provided by regionally-valued open-space).

There are many reasons that may explain why newcomers can affect the utility of existing residents. First, the so-called fight-from-blight hypothesis states that high income people choose suburbs in order to isolate from the problems of central cities (Mieszkowski & Mills, 1993; Downs, 1999; Gordon & Richardson, 1997; Ewing, 1997; Brueckner, 2000, 2001). Therefore, once these wealthy exclusive communities are created, growth should be restricted in order to avoid low income people entering the community and eroding its amenity values. The paper by Evenson (2003) finds evidence of this effect for the US.

However, one problem with this view is that high income communities may have other instruments to do this (e.g., minimum-lot size). In this case, the spatial growth of high-income communities may depend at the end on the number of high income residents that want to move. In areas with a long-history of flight-from-blight (e.g., the US) where most high-income earners are already outside big cities, this supply may be quite low, but in areas like Spain where the process of suburbanization is recent, there may be more high income people willing to move to high-income suburbs. So it may be important to differentiate between early sprawling areas and areas where this experience is more recent. We will explain how to do this in the empirical section. Another problem with the use of the income variable to capture the disamenity effects of population grow is that in non-urban areas and in urban areas with more than one job center, income may have also a positive effect on grow, as we have explained above.

Second, some authors also argue that past growth is related with this disamenity effect. The reason of this behaviour is that in areas growing more rapidly residents are seeing a more concentrated decline of their ‘standards’ of living. Several authors have found empirical evidence of this effect (see, e.g., Evenson, 2003). Third, it may well happen that the effect of population on utility is non-linear. For example, the population-utility profile may be quadratic, population having a positive effect at very small sizes because it allows access to some facilities (public services, access to commerce and jobs, etc) and a negative one once a threshold has been reached (because of rising housing prices and congestion). If this is the case, the derivative of utility with respect to population will also depend negatively on population size. Of course, one also may argue that this effect is more relevant in non-urban areas where there is less commuting than on urban ones, something that we will also take into account in the empirical analysis.

Fourth, the kind of fiscal instruments available to local governments may have some impact on the marginal revenue effect of new development. For example, it has been argued that property tax finance may be a cause of excessive growth, because this means that new development, paying the average instead than the marginal costs of new infrastructure, will be in practice subsidized by old development (Brueckner, 2000). This proposition has successfully been tested by Song and Zenou (2005) for the US. We will not be able to take this into account in the Spanish case, because although the property tax is the main tax in Spain, the regulation of the municipal financing system is the same across the country, meaning that all the municipalities are free to decide whether to rely more or less on the property tax than on user charges or impact fees. However, in Spain, the marginal revenues bring out by a new resident may be not be the same in all the municipalities. For example, the amount of additional property tax revenues and grants that a new resident bring to a municipality need not be the same. In section 4 we will explain why this might be the case in Spain and provide the details on how to compute this marginal revenue effect.

2.2.- *Homeowners vs renters and land developers*

The model presented in the previous section assumes that absentee landowners control the political process. In is interesting to note that, as Brueckner and Lai (1996) show, homeowners (who are residents in the community) still have more incentives to restrain grow than renters, although less than absentee landowners. Therefore, it is natural to extend the same hypotheses developed above to a model that assumes that homeowners control the political process. This is the so-called 'homeowner-voter' hypothesis, proposed by Fischel (1990). However, it is not entirely clear in practice that homeowners have such a high political weight, for several reasons. First, although it is clear that the median voter is a homeowner in most cases, each individual renter may have more influence if the correct model is a swing voter one, as Hilber and Robert-Nicoud (2006) suggest. Second, in practice renters may be bigger group than is typically assumed, since there may be a group of relatively immobile new buyers that are also affected negatively by rising rents. This is the case of young people in Spain, that have a high degree of attachment to home and have a clear preference for buying in the own community[12]. This group is actually pressing strongly the local government asking for more affordable housing, so its influence can not be dissmissed.

The way to account for renters influence in the urban growth model (see, e.g., Brueckner, 1999) is to assume that the local government maximizes a weighted sum renter utility and land values, with weights λ_i and $(1 - \lambda_i)$. In this case, the spatial size of the city can be expressed as:

$$l_i = \frac{(y_i - y_k) + (\beta_k + t_k)(n_k N_k + \lambda_i / (1 - \lambda_i))}{\beta_i (n_k - 1) + (\beta_k + t_k)(n_k + 1)} \tag{5}$$

Expressions (5) allows us to derive the following hypothesis:

H5: *Urban expansion is higher the higher is the political weight of renters in a municipality* ($\partial l_i / \partial \lambda_i > 0$).

The political weight given to renters will depend on its number and on political cloud of a renter (relative to a homeowner). As we have explained above, in the Spanish case it would not be enough to count the real number of renters, but it will be also need to consider the number of potential new buyers, something that we will take into account in the empirical analysis. The relative cloud of a renter in a given municipality may be related to the party in the local government. It is common to consider that parties on the right are more sensitive to homeowners than to the problems of renters or people with problems of housing affordability. We will also take this consideration into account.

The evidence regarding the 'homeowner hypothesis' is scarce even in the US. Some authors argued that this is because traditional analysis considered that the owners land are a monolithic block, disregarding the differences between owners of developed land (i.e., homeowners) and owners of undeveloped land or land developers. Given that land property use to be very concentrated, land developers may be a rather small group. However, as Hilber and Robert-Nicoud (2006) note they may be well organized, so that they may have a high political cloud (relative to a homeowner). These authors model the behavior of land developers by considering that the political process is best represented by a lobbying model. One simpler way to account for this possibility is to assume that the local government does not weight equally the gain of rental income at

[12] We admit that this sociological behavior is at odds with what is implicit in most US discussions. For example, Evenson and Wheaton (2003) clear dismiss the possibility of US people buying in the community where they were grown up.

the edge of the city when more land is developed (which benefits land developers) and the loss in rental income due to a reduction in the level of the land-rent function. If land developers control the political process, only changing rent at the fringe will be considered, and if the reverse is true (homeowners have the power) only interior rents are considered. Denoting by η_i the weight given to land developers, the spatial size of the community can be expressed as:

$$l_i = \frac{(y_i - y_k) + (\beta_k + t_k) n_k N_k}{\left[\beta_i (n_k - 1) + (\beta_k + t_k)(n_k + 1)\right] - \eta_i (\beta_i n_k + t_k)} \qquad (6)$$

Note that when η_i=1 (only land developers count), and there are no income differences, the spatial size of the city is N_k, the free-market value. When η_i=0 expression (6) is equal to expression (4), which represents the restricted spatial size that homeowners desire.

Therefore, expression (6) allows us to derive the following hypothesis:

H6: *Urban expansion is higher the higher is the political weight of owners of undeveloped land in a municipality* ($\partial l_i / \partial \eta_i > 0$).

The problem with testing this hypothesis is that it is quite difficult to measure the political power of the owners of undeveloped land. The shortcut used by Hilber and Robert-Nicoud (2006) is not very compelling. They consider that the % of undeveloped land is a good measure of the political weight of land developers, the reason being that a rise in the % of developed land reduces the share of owners of undeveloped land relative to the owners of developed land. The problem with this procedure is that the % of undeveloped land may be capturing other effects in our model: as we will see below, communities with more open land will prefer to develop more land because the marginal benefit of maintaining this land protected is lower (see also Evenson and Wheaton, 2003).

Therefore, one should look for other ways of accounting for this effect, which might be really important in Spain, given the prevalence of corruption practices involving land developers and local politicians. Therefore, as with the case of renters, we will consider that some politicians are more sensible to the interests of developers than others. The expectation here is also that parties on the right will develop more, since it can be assumed that it is more common that right candidates are land owners or even land developers and have, thus, vested interests in land development and/or the housing industry. The same argument applies to some local parties that gained the mayoralty precisely with the purpose of starting huge developing projects. We will also expect that the incentives to disregard the interests of residents and follow those of a few number of powerful land developers also depend on the quality of the local democracy. We will take into account the fact that local governments not facing serious electoral threat will feel more free to disregard the preferences of the residents. Some papers have recently shown that the degree of electoral competition may be relevant to explain the influence of vested interest on public policies, leading sometimes to the adoption of inefficient policies (see, for example, the paper by Besley et al., 2006, on the positive effect of political competition on the economic growth of US states). Another paper by Solé-Ollé (2006) shows that electoral competition has a clear effect of fiscal policies pursued by Spanish municipalities. It is natural to expect that competition will also have an impact on urban expansion: more competitive communities should in principle be expected to develop less. We will explain in detail in section 4 how we will measure this effect.

2.3.- *Open space benefits and interjurisdictional spillovers*

Let's assume now that the residents in one community also derive benefits from open space. These benefits are modeled in a very simple manner, assuming that they are equal to $\gamma_i(\ell_i - l_i)$, where ℓ_i = is total land area under the jurisdiction of the local go-vernment, $(\ell_i - l_i)$ is the amount of open space, and γ_i is the utility provided by one unit of open space. Let's assume also that the resident in one community also derives utility from open space in the rest of the area, $n_k(\ell_k - l_k)$, but that the utility provided by one unit of regional open space is only $\theta\gamma_i$, with $0 < \theta < 1$. The utility of the mobile renter is now $u_i = c_i - \beta_i N_i + \gamma_i(\ell_i - l_i) + \theta\gamma_k n_k(\ell_k - l_k)$. Maximizing total land value as before we can obtain the following expression for the spatial size of the community:

$$l_i = \frac{((\beta_k + \gamma_k(1-\theta)) + t_k)n_k N_k + (n_k - 1)(\gamma_i \ell_i - \gamma_k \ell_k + 2\theta\gamma_k \ell_k)}{(\beta_i + \gamma_i(1-\theta))(n_k - 1) + (\beta_k \gamma_k(1-\theta) + t_k)(n_k + 1)} \qquad (7)$$

The derivative of (7) with respect of ℓ_i is positive, meaning that the effect of open space is similar to the one of any other amenity: if people value it, there will be more pressure to develop. The sign of the derivative of (7) with respect to γ_i is, however, less clear, since an increase in the value of open space in municipality *i* has the effect of increasing its amenity value (in the nu-merator) but also increases the disamenity effect of population (that this effect increases from β_i to $\beta_i + \gamma_i(1-\theta)$). In the case that the controlling community and the others in the urban area have the same amount of (equally valued) land, the second effect clearly prevails and the value of open space contributes to contain urban expansion. The effect of open land in the area is also unclear, since it depends on the value of θ. For example, when open space is a regional public good (i.e., θ=1) its impact is positive, because only the overall amount of land in the region matters (i.e., the second term in the numerator is $(n_k -1)(\gamma_i \ell_i + \gamma_k \ell_k)$). More generally, the impact of $\gamma_k \ell_k$ increases with θ=1 and is positive if θ>1.

Therefore, expression (6) allows us to derive the following hypotheses:

H7: *Urban expansion is higher the higher the amount of land available for development in the municipality.*

H8: *Urban expansion is higher the higher the environmental value of open space, provided that the amount (and value) of land in the community is similar to the average of the area.*

H9: *Urban expansion is higher the amount of land available for development in the are if the benefits of open space are substantially spread over the urban area*.

There are just a few papers relating the amount of open space to urban expansion. The main effect of the total amount of land find here is very similar to the one identified in Evenson and Wheation (2003). The papers by Evenson and Wheation (2003) and Evenson (2003) provide empirical evidence that communities with more open space really develop more. Hilber and Robert-Nicoud (2006) also provide evidence on this relationship, although they give a political interpretation to this empirical fact. We will test this hypothesis in the empirical section by including the total amount of land in the jurisdiction of the local government in our equation. We will also try to control for the environmental quality of open land by including in the equation several variables measuring the share of open land which is supposed to be more valuable. Also, in our second-step regression, we will analyze the effect of total area land on urban expansion.

2.4.- *Other influences*

The other factors considered here have the purpose of controlling for the fact that communities may grow without the need of expanding its spatial size. This may be done, for example, by rebuilding old zones or by promoting that owners of unused houses put them in the market (either renting or selling). We will measure this effect with variables as the density of population (more dense cities do not have room for growing without expanding its size), and the proportion of old and empty houses (the more of these, the easier will be to rebuild).

3.- Empirical analysis

3.1. *Empirical specification*

Let's assume that in period 0, after winning the elections, the new government of community *i* looks at the structural traits of the municipality and decides that his desired amount of developable land is:

$$l^*_{i,0} = \alpha_1\beta_{i,0} + \alpha_2\lambda_{i,0} + \alpha_3\eta_{i,0} + \alpha_4\ell_{i,0} + \alpha_5\gamma_{i,0} + \alpha_7 z_{i,0} + \alpha_8 N_{k,0} + \alpha_9 n_{k,0} + \alpha_{10} t_{k,0} + \alpha_{11}\ell_{k,0} + \alpha_{12}\gamma_{k,0} + \alpha_{13} z_{k,0} \quad (8)$$

where

$\beta_{i,0}$ = disamenity (or amenity) effects of growth, related to the fiscal and social effects of new residents, including the effects of income (see section 3.3).

$\lambda_{i,0}$ & $\eta_{i,0}$ = political weight of renters and owners of non-developed land , which will be captured by socio-demografic and political variables (see section 3.3)

$\ell_{i,0}$ = total land area under municipal jurisdiction

$\gamma_{i,0}$ = environmental benefits provided by open space in the municipality, which will be measured by the share of open land deemed to be more valuable (see section 3.3)

$z_{i,0}$ = other municipal-specific urban expansion drivers: density, quality of the housing stock, and amenities

$N_{k,0}$ = urban area population (and other demand factors common to all municipalities in the area)

$n_{k,0}$ = number of municipalities in the urban area

$t_{k,0}$ = commuting costs

$\ell_{k,0}$ = total urban land

$\gamma_{k,0}$ = environmental benefits provided by open space in the urban area

$z_{k,0}$ = other urban expansion drivers common to all the municipalities belonging to the area.

We admit that, for the moment, most of these variables are just labels, but we will be explain in detail how to implement them in the section 3.3. Note also that there are two types of variables in the list: those that are municipality-specific and show, therefore, within-area variation, and those that are common to all the municipalities in the same urban area and do not show, therefore, within-area variation. As we will explain in detail in section 3.2 we will exploit this feature econometrically to improve the quality of the estimates.

Then, let's assume for the moment that the actual amount of developable land $l_{i,0}$ is lower than $l^*_{i,0}$ and that the government decides to eliminate this deficit as soon as possible. Given that it takes time to amend existing planning documents or to elaborate new ones, at the end of the term-of-office the government has eliminated a portion ρ_0 of the initial deficit. Of course, during the term the government may decide to allow for more developable land that the planned amount, given new information about the demand. This description of the decision-making process can be summarized in the following equation:

$$\Delta l_i = \rho_0 (l^*_{i,0} - l_{i,0}) + \rho_1 \Delta N_k + \varepsilon_i \quad (9)$$

Where ΔN_k is the population growth (and the growth in other demand variables) for the entire area. Note that we have assumed all the other variables in (8) are time invariant (land area under municipal jurisdiction or political variables which do not change during one term-of-office) or evolve very slowly so they need not be updated frequently. Now, substituting (8) into (9) we obtain the following equation:

$$\begin{aligned} \Delta l_i = {} & \delta_0 l_{i,0} + \delta_1 \beta_{i,0} + \delta_2 \lambda_{i,0} + \delta_3 \eta_{i,0} + \delta_4 \ell_{i,0} + \delta_5 \gamma_{i,0} + \delta_7 z_{i,0} \\ & + \alpha_8 N_{k,0} + \alpha_9 n_{k,0} + \alpha_{10} t_{k,0} + \alpha_{11} \ell_{k,0} + \alpha_{12} \gamma_{k,0} + \alpha_{13} z_{k,0} + \rho_1 \Delta N_k + \varepsilon_i \end{aligned} \quad (10)$$

3.2. *Econometrics*

The estimation of equation (10) entails two main difficulties, namely, the endogeneity and measurement problems of some of the area-wide variables, and the possible estimation bias caused the censoring of the dependent variable.

Endogeneity and measurement problems. The variables that should be used to measure area-wide demand effects (i.e., ΔN_k), as for example, population growth, are endogenous. The reason is that more land available for development will drive land prices down and foster the demand for housing in the area. Note that the ultimate demand factors that drive the increase in developable land and in population may be the same; this may happen, e.g., if the benefits from warm weather are increasingly valued, more population and moving to the south and politicians there are at the same time putting more land in the market to accommodate this demand surge. One way of handling this problem is simply by omitting ΔN_k from the equation and considering that the base-period variables (e.g., those measuring area-wide amenities in $z_{k,0}$ control appropriately for future demand). Of course, if this is not the case and if area-wide demand for space is correlated with other variables in the equation, these coefficients will be biased. Moreover, some of the other area-wide variables (e.g., commuting costs t_k) will be really difficult to measure without error, increasing the possibility of obtainning biased estimates.

Taking these problems into account, and given that our main interest is to understand the decision on the amount of land allowed to be developed at the municipality level, we have decided to break the analysis into two different steps. The first one consists of analyzing only the within-area variation in new land allowed to be developed. To perform this analysis we simply substitute all the area-wide variables in (10) by a set of area fixed-effects, named f_k, obtaining the following expression:

$$\Delta l_i = \delta_0 l_{i,0} + \delta_1 \beta_{i,0} + \delta_2 \lambda_{i,0} + \delta_3 \eta_{i,0} + \delta_4 \ell_{i,0} + \delta_5 \gamma_{i,0} + \delta_7 z_{i,0} + f_k + \varepsilon_i \qquad (11)$$

Now the coefficients obtained for the municipality-specific variables are no longer biased by the possible omission of are-wide variables. The results in section (4) will show that these fixed effects are statistically significant, explain a high proportion of the variance and are correlated with the municipal-specific covariates. Moreover, the results do not only improve with respect to the equation with omitted fixed effects and area-wide variables but also with respect to the direct estimation of equation (10).

The second step consists on performing a between-area analysis using the estimated fixed effect for each area as the dependent variable and the area-wide variables included in (10) as explanatory variables:

$$f_k = \delta_8 N_{k,0} + \delta_9 n_{k,0} + \delta_{10} t_{k,0} + \delta_{11} \ell_{k,0} + \delta_{12} \gamma_{k,0} + \delta_{13} z_{k,0} + \delta_{14} \Delta N_k + \xi_i \qquad (12)$$

Note that although this procedure ensures that the coefficients of the municipality-specific variables (those that are our main interest) are no longer biased, the estimation of the area-wide coefficients in (12) have the same problems than before. Therefore, the results of this second step should be taken with caution.

Censored data. Recall that to justify the adjustment process in (9) we assumed that the actual amount of developable land $l_{i,0}$ is lower than $l^*_{i,0}$. However, this may not be the case in all the municipalities. In many cases the amount of land put in the market by previous governments and still vacant may be sufficient given the forecasted demand. In other cases, the new municipal government may consider that the amount of land allowed to be developed by previous governments is too high (e.g., imagine that the new government puts a very high/low weight on homeowners/owners of undeveloped land or that cares a lot for the environment). But, even if the desired amount of developable land is higher than the actual amount, the local government will find very difficult to convert already developable land into open space. The reason of this irreversibility of status is that when a land plot is granted the condition of developable its the price increases abruptly, and the Spanish law considers than once this right has been created it can not be removed[13,14]. The only possibility for a government to revert the situation is by buying open space, something that it is not very common in Spain, given the shortage of financial resources of many local governments. Therefore, although in many cases the desired increase in developable land Δl_i^* is negative, the real increase Δl_i appears to be zero. In fact, around 25% of the observations of Δl_i in our database are zero. This means that our dependent variable is censored or truncated around zero. The problem with this kind of data is that OLS estimates of equation (11) will be biased if the deci-sion to expand or not developable land is correlated with the desired increase in the amount of developable land.

To solve this problem we will estimate a Tobit model following the two-step procedure proposed by Heckman (1976 and 1979). In the first step we will estimate a selection equation using a probit model of the decision to expand the amount of developable land, where the dependent variable is and indicator equal to one if Δl_i>0 and equal to zero if Δl_i≤0. The explanatory variables for this first step will be all those included in (11). The results of the probit estimation are used to construct the “inverse of the Mill’s ratio”, denoted by $\pi_{i,0}$. Then we estimate equation (11) using only those observations with Δl_i≥0 and controlling for $\pi_{i,0}$. The results of this regression provide the expected value of Δl_i conditional on this variable being positive:

$$E(\Delta l_i / \Delta l_i > 0) = \delta_0 l_{i,0} + \delta_1 \beta_{i,0} + \delta_2 \lambda_{i,0} + \delta_3 \eta_{i,0} + \delta_4 \ell_{i,0} + \delta_5 \gamma_{i,0} + \delta_7 z_{i,0} + f_k + \delta_8 \pi_{i,0} \qquad (13)$$

where

[13] Note that the rise in the price of land as a result of its changing status is higher the more restrictive was the growth control (the farther the market-size boundary of the community) and the smaller is its increase. That is, if growth controls are relaxed in response of growing demand but do not keep the pace, the increase in price of the new developable land plots can be high.

[14] Note that the capital gain which arose as a result of this price increase can be realized by selling it. Therefore, as the new buyer has paid the market price, any future reversion of status (from developable to open space) will harm a person which may be different than the one which benefited form the initial conversion.

$\delta_8 = \sigma(\varepsilon)\mu(\varepsilon,\eta)$ is the coefficient of the “inverse of the Mill’s ratio” which is equal to the product between the variance of the error term of equation (11) and the covariance between this error term and that of the selection equation.

$\pi_{i,0} = \varphi(-w_{i,0}/\sigma(\eta))/\left[1-\Phi(-w_{i,0}/\sigma(\eta))\right]$ is the “inverse of the Mill’s ratio”, where $\varphi(\bullet)$ and $\Phi(\bullet)$ are the density and the distribution functions of the probit, and $\sigma(\eta)$ is the variance of the error of the selection equation, and $w_{i,0}$ is the product between the estimated coefficients and the variables used in the first step.

3.3. *Variables and data*

Sample and data on developable land.

Equation (13) will be estimated with data on 2,212 Spanish municipalities for the period 1999-2003. Spain has more than 9,000 municipalities, but most of them are quite small. We had land-use and census data for all of them, but we lack important economic data for municipalities below 1,000 residentes (e.g., income). Our database on fiscal variables only provides data for a sample of representative municipalities in the interval 1,000 to 20,000. Then, we also had to eliminate from the sample a few municipalities for which either we lacked the political data or the data we had was not reliable. At the end, we were thus restricted to the sample of 2,212. Our feeling is that this sample is representative of the full population because the vast majority of big municipalities (those above 5,000 residents) are present and some checks done on the sample for the smaller ones suggests that average values of some variables are not very different when compared with the totals.

The period analyzed is also a very good one because, as can be checked in the tables of the Annex, urban expansion has been very high during this period. Moreover, the huge database used in the analysis could not be assembled for previous periods. Our land-use data covers the period 1994-2003. However, we had problems in finding some of the variables for years previous than 1999. Moreover, the period of analysis, 1999-2003 corresponds exactly with a municipal term-of-office, which in Spain lasts the same four years for all the municipalities, since elections are always done simultaneously.

The data used to measure the amount of developable land comes from the Spanish national property assessment agency (Dirección General del Catastro) and arises as a byproduct of the assessment process which this agency performs on all properties of the country. Although value reassessments are carried only from time to time, the update in the traits of each property (and thus its classification as developed, developable or not developable) is done yearly. The variable used to measure developable land has been constructed as the summation of buildup and vacant land areas (*superficie edificada* and *superficie de solares*). This is the only statistical source of data covering all Spain that can be used to measure the land-use category of undeveloped urban plots. For example, the very rich data provided by the aerial photographs of the *Corine Land Cover* project (Ministerio de Fomento, 2006) could not be used in our case because they only measure what can be seen (already developed land) but not what has been approved by the local government but does not yet exists (land allowed to be developed). Recall that our position is that this last variable is the one that has to be analyzed, because it is the main regulatory decision taken by the local government.

This variable as some peculiar traits. First, as a result of the irreversibility of land-use decisions (recall the discussion in the previous section) the increase in this variable is always positive or zero. Second, land-use changes happen only from time to time, the reason being that are both lengthy and potentially conflictive. This means that this variable does not evolve continuously from on year to the following one but jumps in certain years. These traits recommended not trying to model the yearly changes in this variable, so we decided to use instead the growth in develo-pable land during all the term-of-office (1999-2003). This has been done at no cost in terms of explanatory variables, because most of them can only be measured at one data point during this period (e.g., census data or political data, which is recorded only after one election). The explanatory variables have been measured for 1999 or for the more closest year (e.g., census variables are for 2001).

Disamenity-amenity effects of growth (β)

We have selected several variables to account for this type of effects, which are related to the additional long-term revenues and expenditures generated by new residents and to the short-term revenues generated, which may also be important if politicians are short-sighted.

Marginal revenue effects. To account for the flight-from-blight hypothesis we include in the equation average community income at the beginning of the period (*income*), expecting a negative sign. The discussion in section 2 suggested that this variable could capture also direct amenity effects, so the effect could also be positive. These direct amenity effects are more probable to appear in non-urban municipalities than in tourist and urban ones. To account for this fact we interact the income variable with two dummies which identify which municipalities should be considered to belong to tourists and urban areas (see below the description of how these areas have been created). We expect the sign of these interactions (*income* × *urban* and *income*×*tourist*) to be negative. We also argued that these direct amenity effect could also appear in urban municipalities with a short history of suburbanization. To account for this possibility we create a dummy equal to one if the community belongs to a urban area where the income per capita of the central city relative to the are has fallen during the previous five-year period (*central-city-decline*); the more the income of the central city has fallen the stronger (and probably the older) would have been the suburbanization process. Then we will add to our equation an interaction between income per capita and the dummy (*income*×*central-city-decline*).

We also constructed several measures of the impact of new residents on municipal revenues and costs. Municipal revenues affected by new development (R_i) are the sum tax revenues (T_i) and grants (G_i):

$$R_i = T_i + G_i \qquad (9)$$

Tax revenues affected by growth are either the *vehicle license tax*, *user charges*, *impact fees*, a *tax on building activity* and, *tax on land transmission*, the *property tax* and *inter-governmental transfers*. We assume that the impact of a new resident is potentially the same across municipalities in all these instruments with the exception of the property tax and intergovernmental transfers. In the case of the property tax potential revenues can be expressed as:

$$T_i^p = \bar{t}\,(N_i^o b_i^o + N_i^n b_i^n) \qquad (10)$$

Where $\bar{t}$ = average tax rate, N_i^o and N_i^n = number of old an new residents, b_i^o and b_i^n = average assessed value per housing unit of old and new housing units. We assume that $b_i^o < h_i^n$[15]. Now, the marginal property tax paid by a new resident is:

[15] The justification of this assumption is related to the way property value assessments are done in Spain. The assessment ratio uses is around 0.25 and is assumed to be applied equally to all houses. Reassessment delays are quite long (the average number of years between reassessments is around ten). Between two reassessments the assessment value of old houses is updated but not enough to keep pace with rising housing prices. However, new housing units are assessed at the common assessment ratio but using the actual market value as a base. The result is that new houses pay higher taxes than old ones. This stylized fact is not exclusive of Spain;

$$\frac{\partial T_i^p}{\partial N_i} = \bar{t}\, b_i^n \qquad (11)$$

Expression (11) will differ across municipalities because the market value of new houses is also different. We will add this variable (Δ*property-revenues*) to our equation, expecting a positive effect on growth. The variable will be computed for each municipality combining of the five-year previous period.

Grant revenues are also affected by population growth in Spain and the magnitude of the increase also differs across municipalities. The main grant received by the Spanish municipalities is an unconditional grant which is distributed 75% using weighted population (see, Bosch and Solé-Ollé, 2005, for details). The formula is:

$$G_i = \sum_j \psi_j d_{ij} \bar{g}^N N_i + g_i^O \qquad (12)$$

Where ψ_j = population weights, which grow with population (e.g., one resident in a municipality with population less than 5,000 weights 1 while in a city with population higher than 500,000 this weight is 2,8), d_{ij} = dummy equal to one if the municipality *i* is in the population bracket *j*, $\bar{g}^N$ = average grant per adjusted resident and g_i^O = per capita grant received by municipality *i* from variables other than population (which is assumed to be invariant with respect to population grow). Now the marginal grant received is:

$$\frac{\partial G_i}{\partial N_i} = \psi_j d_{ij} \bar{g}^N + (\psi_{j+1} - \psi_j)(d_{ij+1} - d_{ij})\bar{g}^N N_i \qquad (13)$$

The first term of expression (13) is the own grant that a new resident brings to the municipality and it grows with population size albeit in a non-linear way. This variable has been computed for each municipality with data on the weights and average transfers for the first year of the period (Δ*grants*). The second term captures the increase in grants which occurs when a municipality jumps from a lower to a higher bracket when population grows. Of course, there are practically no municipalities in this marginal situation. Note, however, that as local planning use to be based in the long-run population that the municipality wants to reach, the planned future population grow is not discrete. If this is the case, it is natural to assume that local politicians will take into account the potential future gain in per capita grants. However, since it may take many

see Strumpf (1999) for US evidence and for a political economy rationalization of this behavior and an analysis of how it affects the decision to reassess.

years to achieve the level of planned population it is also natural to consider that the incentive to take into account this gain is lower the far is actual population from the nearest threshold. To take this into account we define a new variable (Δ*grants-per-resident*) which we compute as:

$$\frac{\partial G_i}{\partial N_i} = \sum_i d_{ij}(\psi_{j+1} - \psi_j)(\tilde{N}_{ij+1} - N_{ij})^{-\omega} \bar{g}^N N_i \tag{14}$$

Note that expression (14) assumes that the gain in transfers is higher the higher is the size of the 'jump' and the lower is the distance between population and the next threshold. This variable has also been computed for each municipality with 1999 data.

Marginal expenditure effects. On the expenditure side it is often asserted that population growth contributes to the deterioration of the quality of public services and/or to the increase in the cost of providing it (Ladd, 1992). This may happen if new residents will crowd existing facilities and new ones should be constructed. Costs may rise also if new development is less dense than the previous one (Ladd, 1994) or if a bigger city has a harsher environment (e.g., rising crime and other social problems) making also more costly to finance actual service levels. We will measure the effect of new residents on costs departing from the definition of expenditure needs (E_i) which is the amount of money needed to provide a standard level of service in municipality *i* given population size and other environmental cost variables. The effect of population grow on costs can be expressed as:

$$\frac{\partial E_i}{\partial N_i} = \frac{e_i}{\bar{e}} \bar{s} + \frac{\partial e_i / e_i}{\partial N_i} N_i \frac{e_i}{\bar{e}} \bar{s} \tag{15}$$

The first term of expression (15) is the expenditure on each new resident, computed as the product of an expenditure needs index ($e_i / \bar{e}$, which is equal to one when the municipality has expenditure needs equal to the average) and average per capita spending. We will compute this variable (Δ*costs*) using the expenditure needs index computed for Spanish municipalities in Bosch and Solé-Ollé (2006) and data for the first year of the period; the variables and coefficients of this index have been selected after estimating an spending equation with a sample which is very close to the one we use in this paper. One interesting trait of this index is that one of the variables is weighted population. Although the weights are also related to population size (as in the case of the grant) the shape of the profile is different: per capita costs decrease abruptly for low population sizes (below the 5,000 threshold) and increase afterwards but becoming completely flat at the 50,000 residents. Of course, the other variables considered in the index (i.e., *% unemployed*, *% inmigrants*, *responsibilities*, *tourists*) also contribute to give variation to this variable.

The second term in (15) is the proportional change in per capita needs when population increases. The only needs variable that is assumed to change with population is weighted population. In this case, the derivative captures the proportional change in costs as population increases. Recall that the population profile has a downward slope below 5,000 residents; this means that for municipalities in this size, increasing popula-tion decreases per capita costs. Conversely, for municipalities above 5,000 residents, increasing population increases per capita costs, but a decreasing rate, while there is no increase above 50,000 residents. It can be shown that the derivative in (15) is exactly the difference in the population weights of two consecutive brackets divided by the length of the bracket in terms of population. We use the weights estima-ted in Bosch and Solé-Ollé (2006) and data for the first year of the period to compute this second term which we will name (Δ*costs-per-resident*).

Marginal net effects. In some of the estimated equations we introduced all the above effects separately. Note, however, that what is interesting the net fiscal impact of a new resident, which can be computed as: *fiscal-impact* = Δ*property tax* + Δ*grants* +Δ*costs* +Δ*costs-per-resident.* The Δ*grants-per-resident*, which is certainly different in nature from the other effects, will always be entered separately in the equation. This specification, with only two variables, is certainly more parsimonious.

Revenue machine. In the discussion above we have implicitly assumed that the local government is responsive to the interests of its residents, so it will take into account both the additional revenues and costs created by new development. However, it is also possible that local politicians consider the positive impact of development, namely increased revenues but not the negative one, increasing costs. This sort of fiscal illusion may occur, for example, if politicians have a short time horizon and develop-ment revenues come before costs. Note, for example, that the costs variables introduced in the previous paragraphs measure the permanent or long-term effect of a new resident on costs, and that the revenue variables measure the permanent or long-term effect of revenues. However, in our calculation of the revenue variables we have discarded some revenue sources because they do not change with population and/they are equal across municipalities. The revenue sources more prone to create this sort of fiscal illusion are the *tax on building activity* and the *tax on land transmission* which are both paid once for all. Another source of fiscal illusion is the parafiscal charge imposed on developers, who must give to the local government a proportion of developed land that goes from 10 to 25% depending on the region. This land can be used to build facilities or social housing but many municipalities simply decide to sell it in the market to get additional funds. As we commented in the introduction, Spanish governments have been often blamed of putting too much land in the market simply to get these short-term revenues; we will term this the *Revenue-machine* hypothesis. Note that this hypothesis is very difficult to test, since these instruments have the same effect across municipalities; of course one may think that the revenues will be higher the more development we have, but intended development is our dependent variable. The way we use to test this hypothesis is to assume that some municipalities will be more prone than other to account only for the short-term benefits of growth. These municipalities will those that are in a more weak financial position, namely those that have a higher debt stock and a lower current surplus. Since we do not have information on the debt stock we use as a proxy the per capita amount of interest and principal paid in the first year of the period (*debt*); the current surplus (*surplus*) has been computed as: *surplus = current revenues – impact fees – current expenditures + interests on debt*.

Residents vs. housing. Up to now we have considered that the growth in residents and houses are equivalent. This is appropriate for analyzing urban areas, where people choose its municipality of residence. However, this is not as appropriate for tourist areas where most building is related to vacation homes. One municipality located in one of these areas may growth a lot in houses but not in population. Since some of the additio-al revenues and costs are related to permanent residents (e.g., grants only do not take into account visitors, only residents), the marginal impact of a new development may be different in these areas. This does not mean that the previous variables are not appro-riate: they are, but they only account for the incentives of these municipalities regarding new residents, not visitors, so we need some additional variables. First, new vacation houses are also assessed using as a basis the market price, so additional property taxes should be taken into account. We interact this variable with a dummy indicating if the municipality is located in a tourist area or not: Δ*property tax* × *tourist.* It is also said that tourist municipalities do not take real care in satisfying the needs of visitors; this is because they typically stay in the municipality only for a very short period (i.e., summer in the beaches and winter in snowing resorts). This means that additional spending may be disregarded in tourist municipalities so we need not have any additional effect into account. However, tourist municipalities in Spain often complaint that they are in a bad financial situation given that the grant system do not compensate for visitors; they are also specially blamed of using development decisions as a revenue machine. So we will also introduce in our equation interactions between the debt and surplus variables and the tourist dummy: *debt* × *tourist* and *surplus* × *tourist.*

Political weight of renters and owners of undeveloped land (λ and η)

The model presented in section 3 clearly predicted that the amount of developable land will increase the more numerous and powerful are renters and owners of undevelo-ped land in a municipality. We will include the proportion of families that are renters to control for this (*% renters*). Note that this variable has a problem in our case, since the rate of homeownership in Spain is really high, meaning that in our sample there is no municipality with more than 20% of renters. Therefore, this group is really small to assume that is able to have a great deal of influence on local politics. This is the reason that we also introduced in the equation the proportion of voting population which is between 25 and 40 years (*% residents-25to40*). People from this age group composes the majority of new buyers and renters and, given the high level of attachment to the home-municipality, they have a clear preference for buying in the own community. Therefore, they constitute a sizeable voting group that should be given some weight in the local political process.

We also include some political variables in the equation. First of all, we include a couple of dummies which measure the ideology of the mayor: *center-mayor* takes the value one for the party/parties which we consider that occupy the center of the political arena, in the sense that they use not to have any party at the left or at the right, and *right-mayor* takes the value one for the parties which are on the right of the center ones; the excluded category, *left-mayor* is one for the parties on the left of those in the center. The parties identified to be on the left are the former communists (IU) and some left-wing regionalist parties (BNG, ERC) which are usually considered as more against-development. The parties in the center are the main left party (PSOE) and some center-right regionalist parties (PNB and CiU); even if it seems strange to mix these parties, the tests we have performed indicate that these are the appropriate groupings. The parties on the right are the main right party (PP) and some right regionalist parties who are natural partners of it (UV, UPN). We also include in the equation a dummy which identifies if the mayor belongs to a local party (*local-party-mayor*). The expectation regarding these effects is that right parties should foster more urban expansion than the center ones and that these should be more pro-development than the left ones. It is difficult to make a prediction for the local parties since this category is very heterogeneous, including both some parties with vested interests in development and also civic movements which arise, precisely, with the aim of fighting against development.

We include also a coalition dummy (*coalition*) and the expectation here is to find a negative effect on urban expansion, derived from the fact that coalition use to find very difficult to pass projects that are very conflictive. We also include a measure of electoral competition, computed as the absolute distance between 50% and the vote obtained in the last elections by the party or parties in the local government (*margin*). We expect that the higher the lower electoral competition (the higher the margin) the lower the incentives to account for the interests of residents and the higher the possibility of following those of land developers. All these political variables are measured with information coming from two databases on votes, councillors and mayoralty arising from the 1999 municipal elections, which were provided by the Spanish government. We also will consider some interactions between the ideological dummies and the electoral margin, in order to account for the possibility that parties with different ideologies react differently to electoral competition, as the work by Solé-Ollé (2006) suggests. The idea here is that when the margin is higher the parties are freer to apply their political program; if the platform of the left/right is openly against/for development a left/right party may restrain/promote more growth when the margin is higher.

Open land benefits.

To account for this factor we include in the equation the total amount of land under the jurisdiction of the municipality (*total-land-area*) and the proportion of open land that is not in agricultural use, considering separately the proportion of forest (*% forest-land*) and of other uses (*% other-non-agricultural-land*). The data to compute these shares comes from the Spanish agricultural census. We consider this a first step and we plan to improve these variables with data coming from the *Corine Land Cover* project for the year 2000, which will help us in identifying more carefully the land with some environmental values (e.g., Natura 2000 networks or land exposed to risks, etc).

Defining urban areas.

Urban areas include all the municipalities located at less than 30Km of a central city with more than 100,000 residents or at less than 15Km of a central city of more than 50,000 but less than 100,000 residents. Overall, we have identified 64 urban areas (see the map in the Annex). Non-urban areas include all the municipalities in a province (NUTSII EU regions) that are neither urban nor tourist. Since there are 50 provinces there are also 50 non-urban areas. Tourist areas are the non-coastal municipalities located at less than 10 Km of a main tourist municipality, plus the coastal municipalities located at less than 10 Km of a main coastal tourist municipality, plus the non-coastal municipalities located at less than 5Km of any coastal municipality included in the tourist area. A main tourist resort is a municipality with a tourist index higher than 300 that do is not located at less than 10 Km of another tourist municipality with this trait but with a higher tourist index. The tourist index is computed as the average per capita local business tax revenues coming from the tourist-related activities (e.g., hotels, restaurants, etc.), and is expressed with relation to the average. Using this procedure, we have identified 99 tourist areas.

4.- Results

(INSERT TABLE 1)

(pendiente de redacción)

5.- Conclusion

(pendiente de redacción)

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Table 1: *Determinants of new municipal developable land;*
dependent variable: Δ *developable land area; period:* 2003-1999 *term-of-office.*
Sample: urban, non-urban & tourist municipalities (*no obs.*=2212); *Tobit estimation*

	(i)	(ii)	(iii)	(iv)	(v)	(vi)
a.- Disamenity/amenity effects of growth						
income	0.201 (2.639)***	0.234 (2.547)***	--.--	--.--	0.237 (3.029)***	0.284 (2.587)***
income × *urban-area*	--.--	-0.112 (-2.113)**	--.--	--.--	--.--	-0.113 (-2.206)**
income × *central-city-decline*	--.--	-0.065 (-1.975)*	--.--	--.--	--.--	-0.071 (-1.784)*
income × *tourist-area*	--.--	-0.154 (-2.411)**	--.--	--.--	--.--	-0.133 (-2.150)**
lagged population growth	-0.031 (-1.241)	-0.033 (-1.350)	--.--	--.--	-0.035 (-1.548)	-0.040 (-1.450)
lagged housing growth	-0.012 (-2.088)**	-0.008 (-1.745)*	--.--	--.--	-0.017 (-2.345)**	-0.012 (-2.114)**
lagged housing growth × *tourist*	--.--	-0.005 (-2.110)**	--.--	--.--	--.--	-0.004 (-1.984)**
population	-0.014 (-0.718)	-0.002 (-0.650)	--.--	--.--	-0.001 (-0.468)	-0.001 (-0.635)
population × *urban*	--.--	-0.001 (-0.514)	--.--	--.--	--.--	-0.001 (-0.643)
population × *tourist*	--.--	-0.001 (-0.624)	--.--	--.--	--.--	-0.001 (-0.540)
net-fiscal-impact	0.002 (1.423)	0.001 (0.756)	--.--	--.--	0.001 (0.654)	0.001 (0.438)
Δ*transfers-per-resident*	0.056 (2.072)**	0.049 (2.104)**	--.--	--.--	0.039 (1.348)	0.041 (1.541)
debt	0.014 (1.842)*	0.015 (1.985)**	--.--	--.--	0.009 (2.105)**	0.010 (2.014)**
surplus	-0.026 (-1.951)*	-0.024 (-2.010)**	--.--	--.--	-0.024 (-2.205)**	-0.025 (-2.258)**
Δ*property tax* × *tourist*	--.--	0.001 (1.207)	--.--	--.--	--.--	0.001 (1.334)
debt × *tourist*	--.--	0.005 (1.541)	--.--	--.--	--.--	0.007 (1.600)
surplus × *tourist*	--.--	-0.010 (-1.624)*	--.--	--.--	--.--	-0.012 (-1.447)
b.- Political influence						
% renters	--.--	--.--	-0.128 (-1.323)	-0.128 (-1.255)	-0.129 (-1.359)	-0.129 (-1.255)
% residents-25to40	--.--	--.--	0.984 (2.145)**	0.995 (2.015)**	1.001 (2.310)**	1.020 (2.258)**
center-mayor	--.--	--.--	0.047 (2.530)***	0.045 (2.621)***	0.044 (2.468)**	0.044 (2.511)***
right-mayor	--.--	--.--	0.054 (2.600)***	0.052 (2.542)***	0.049 (2.598)**	0.050 (2.661)***
local-party-mayor	--.--	--.--	-0.024 (-1.236)	-0.030 (-0.951)	-0.030 (-1.026)	-0.029 (-1.140)
coalition	--.--	--.--	-0.003 (-0.498)	-0.002 (-5.360)	-0.005 (-0.284)	-0.004 (-0.510)
% vote-margin	--.--	--.--	0.142 (1.984)**	--.--	0.150 (2.340)**	--.--
left-mayor × *% vote-margin*	--.--	--.--	--.--	-0.074 (-1.241)	--.--	-0.084 (-1.356)
center-mayor × *% vote-margin*	--.--	--.--	--.--	0.120 (1.589)	--.--	0.144 (1.605)
right-mayor × *% vote-margin*	--.--	--.--	--.--	0.153 (1.896)*	--.--	0.149 (1.904)*

Table 1 (continued)

c.- Open space benefits						
total-land-area	0.044 (5.015)***	0.045 (4.514)***	0.049 (5.704)***	0.045 (5.364)***	0.044 (5.315)***	0.045 (5.412)***
% forest-land	-0.057 (-2.308)**	-0.051 (-2.165)**	-0.042 (-2.019)**	-0.040 (-2.210)**	-0.056 (-2.478)***	-0.052 (-2.433)**
% other-non-agric.-land	-0.037 (-2.540)**	-0.029 (-2.300)**	-0.029 (-2.154)**	-0.030 (-2.001)**	-0.036 (-2.054)***	-0.038 (-2.114)**
d.- Other influences						
developable-land	-0.288 (-6.840)***	-0.285 (-5.412)***	-0.301 (-4.208)***	-0.300 (-4.102)***	-0.275 (-4.760)***	-0.285 (-4.520)***
density	0.040 (2.549)***	0.041 (2.210)**	--.--	--.--	0.021 (2.264)*	0.023 (2.059)**
% old-housing	-0.193 (-1.925)*	-0.185 (-2.054)**	-0.152 (-2.921)***	-0.144 (-2.774)***	-0.187 (-3.644)***	-0.176 (-3.259)***
% empty-housing	0.145 (2.140)**	0.121 (1.755)*	0.132 (1.985)**	0.110 (1.620)	0.133 (1.593)	0.135 (1.401)
% unemployed	0.422 (1.316)	0.568 (1.698)*	0.451 (0.785)	0.601 (1.541)	0.462 (0.598)	0.685 (0.514)
% unemployed $\times$ *urban-area*	--.--	-0.301 (-1.411)	--.--	-0.351 (-1.341)	--.--	-0.299 (-1.014)
e.- Controls						
suburb	0.028 (1.955)*	0.030 (1.881)*	0.021 (1.451)	0.018 (1.236)	0.022 (1.443)	0.020 (1.624)
distance-to-central-city	-0.008 (-1.855)*	-0.012 (-1.741)*	-0.010 (-1.501)	-0.011 (-1.367)	-0.010 (-1.594)	-0.012 (-1.412)
coast	0.022 (1.757)*	0.031 (2.214)**	0.014 (2.596)***	0.014 (2.441)***	0.010 (2.987)***	0.011 (2.774)***
distance-to-coast	-0.011 (-1.956)*	-0.015 (-2.154)**	-0.012 (-2.341)**	-0.014 (-2.224)**	-0.014 (-2.541)**	-0.015 (-2.412)***
tourist-municipality	0.003 (1.030)	0.001 (0.774)	0.003 (0.847)	0.003 (0.624)	0.003 (0.951)	0.004 (0.745)
economic-activity	-0.034 (-1.544)	-0.042 (-1.620)	-0.027 (-1.234)	-0.032 (-1.356)	-0.033 (-1.196)	-0.035 (-1.394)
inverse of Mill's ratio	0.095 (17.119)***	0.099 (16.524)***	0.100 (18.756)***	0.101 (17.895)**	0.095 (16.543)***	0.099 (16.584)***
urban-area-dummies (64)	YES	YES	YES	YES	YES	YES
tourist-area-dummies (99)	YES	YES	YES	YES	YES	YES
rural-area-dummies (50)	NO	NO	NO	NO	NO	NO
adj.-R^2	0.331	0.325	0.293	0.285	0.374	0.365
F-est. (all variables)	6.038**	6.024**	5.964**	5.844**	6.245**	6.124**
F-est. (disamenity/amenity)	11.014**	10.258**	12.874**	12.895**	13.411**	12..741**
F-est. (political)	7.445**	8.520**	7.566**	7.001**	6.998**	6.771**
F-est. (open space benefits)	18.411**	19.562**	21.001**	17.412**	17.521**	17.018**
F-est. (amenity controls)	6.412**	6.854**	6.335**	6.745**	6.666**	6.548**
F-est. (urban area dummies)	9.140**	8.749**	7.984**	7.741**	6.898**	6.785**
F-est. (tourist area dummies)	6.102**	6.251**	5.951**	5.745**	6.133**	6.441**
F-est. (non-urban dummies)	3.038	3.024	2.964	3.844	3.245	2.124

Notes: (1) All explanatory variables (to the exception of the %) are measured in logs and refer to the base year 1999. (2) ***, ** & * = statistically significant at the 99, 95 and 90%.

Annex:

Table A.1
% of land area in different land-use categories in 1995, 1999 *and* 2003

	Spain	*Urban areas*	*Tourist areas*	*Non-urban areas*
1995				
Developable	2.452	5.947	4.618	1.120
Build-up	1.473	3.739	2.336	0.705
Vacant	0.979	2.208	2.282	0.415
Not-developable	97.548	94.053	95.382	98.880
1999				
Developable	2.693	6.625	4.899	1.237
Build-up	1.634	4.120	2.590	0.791
Vacant	1.059	2.505	2.310	0.446
Not-developable	97.307	93.375	95.101	98.763
2003				
Developable	3.028	7.497	5.412	1.409
Build-up	1.831	4.589	2.963	0.895
Vacant	1.197	2.908	2.449	0.513
Not-developable	96.972	92.503	94.588	98.591

Source: Dirección General del Catastro

Table A.2
% growth rates of land area in different land-use categories in the periods 1995-1999 *and* 1999-2003

	Spain	*Urban areas*	*Tourist areas*	*Non-urban areas*
1995-1999				
Developable	0.094	0.108	0.059	0.099
Build-up	0.103	0.097	0.103	0.115
Vacant	0.079	0.126	0.012	0.072
Not-developable	-0.002	-0.007	-0.003	-0.001
1999-2003				
Developable	0.117	0.124	0.099	0.130
Build-up	0.114	0.108	0.135	0.124
Vacant	0.123	0.149	0.058	0.141
Not-developable	-0.003	-0.009	-0.005	-0.002
1995-2003				
Developable	0.211	0.232	0.159	0.230
Build-up	0.217	0.205	0.238	0.239
Vacant	0.202	0.275	0.070	0.213
Not-developable	-0.006	-0.017	-0.008	-0.003

Source: Dirección General del Catastro

Table A.3

% growth rates of land area in different land-use categories in during 1999-2003: *faster-growing areas*

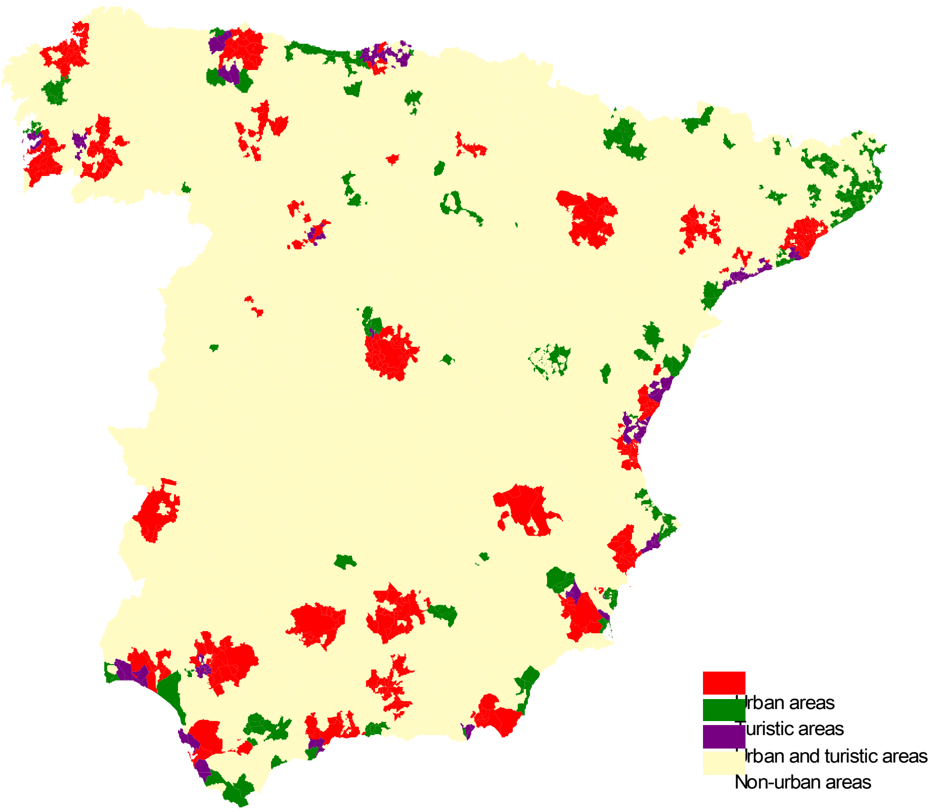
Urban areas	Murcia	Almería	Huelva	Jaén	Madrid
Developable	0.549	0.325	0.406	0.253	0.229
Build-up	0.190	0.149	0.250	0.281	0.174
Vacant	1.075	0.661	0.700	0.199	0.299
Not-developable	-0.030	-0.008	-0.010	-0.005	-0.056

Non-urban areas	Las Palmas de Gran canaria	Granada	Guadalajara	León	Madrid
Developable	0.444	0.311	0.678	0.591	0.500
Build-up	0.406	0.442	0.209	0.668	0.352
Vacant	0.464	0.008	1.318	0.484	0.719
Not-developable	-0.010	-0.002	-0.008	-0.004	-0.021

Tourist Areas	Finestrat (Alacant)	Punta Umbría (Huelva)	San Vicente de la Barquera (Santander)	Antigua (Las Palmas)	Arroyo de la Encomineda (Valladolid)
Developable	0.361	0.457	0.339	0.896	0.628
Build-up	0.214	0.298	0.262	1.301	0.311
Vacant	0.596	0.728	0.434	0.810	1.015
Not-developable	-0.066	-0.031	-0.009	-0.016	-0.048

Notes: See section 4 for a definition of the three types of areas considered.
Source: Dirección General del Catastro

Map A.1.
Delimitation of Urban, Tourist and Non-urban areas in Spain



Notes: (1) See section 4 for a description of the criteria used to select the municipalities belonging to each area

(2) Note that there is some overlapping between adjacent Urban and tourist areas.

Source: Own elaboration.